

- Aeschbach-Hertig, W., Kipfer, R., Hofer, M., Imboden, D.M., Wieler, R., and Signer, P., 1996, Quantification of gas fluxes from the subcontinental mantle; the example of Laacher See, a maar lake in Germany: *Geochimica et Cosmochimica Acta*, v. 60, no. 1, p. 31-41.
- Aka, F.T., Kusakabe, M., Nagao, K., and Tanyileke, G., 2001, Noble gas isotopic compositions and water/gas chemistry of soda springs from the islands of Bioko, Sao Tome and Annobon, along with Cameroon volcanic line, West Africa: *Applied Geochemistry*, v. 16, no. 3, p. 323-338.
- Aka, F.T., Nagao, K., Kusakabe, M., Sumino, H., Tanyileke, G., Ateba, B., and Hell, J., 2004, Symmetrical helium isotope distribution on the Cameroon volcanic line, West Africa: *Chemical Geology*, v. 203, no. 3-4, p. 205-223.
- Allard, P., Jean-Baptiste, P., D'Alessandro, W., Parello, F., Parisi, B., and Flehoc, C., 1997, Mantle-derived helium and carbon in groundwaters and gases of Mount Etna, Italy: *Earth and Planetary Science Letters*, v. 148, no. 3-4, p. 501-516.
- Allegre, C.J., Staudacher, T., Sarda, P., and Kurz, M., 1983, Constraints on evolution of Earth's mantle from rare gas systematics: *Nature*, v. 303, no. 5920, p. 762-766.
- Althaus, T., Niedermann, S., and Erzinger, J., 2003, Noble gases in olivine phenocrysts from drill core samples of the Hawaii Scientific Drilling Project (HSDP) pilot and main holes (Mauna Loa and Mauna Kea, Hawaii): *Geochemistry, Geophysics, Geosystems*, v. 4, p. no.1, 22.
- Barfod, D.N., Ballentine, C.J., Halliday, A.N., and Fitton, J.G., 1999, Noble gases in the Cameroon Line and the He, Ne, and Ar isotopic compositions of high mu (HIMU) mantle: *Journal of Geophysical Research*, v. 104, no. 12, p. 29,509-529,527.
- Baskov, Y.A., Vetshteyn, V.Y., Surikov, S.N., Tolstikhin, I.N., Malyuk, G.A., and Mishnina, T.A., 1973, Isotope composition of H, O, C, Ar and He in hot springs and gases in the Kuril-Kamchatka volcanic region as indicators of formation conditions: *Geochemistry International*, v. 10, no. 1, p. 130-138.
- Breddam, K., Kurz, M.D., and Storey, M., 2000, Mapping out the conduit of the Iceland mantle plume with helium isotopes: *Earth and Planetary Science Letters*, v. 176, no. 1, p. 45-55.
- Buikin, A., Trieloff, M., Hopp, J., Althaus, T., Korochantseva, E., Schwarz, W.H., and Altherr, R., 2005, Noble gas isotopes suggest deep mantle plume source of late Cenozoic mafic alkaline volcanism in Europe: *Earth and Planetary Science Letters*, v. 230, no. 1-2, p. 143-162.
- Burnard, P., and Harrison, D., 2005, Argon isotope constraints on modification of oxygen isotopes in Iceland basalts by surficial processes: *Chemical Geology*, v. 216, no. 1-2, p. 143-156.
- Burnard, P., Harrison, D., Turner, G., and Nesbitt, R., 2003, Degassing and contamination of noble gases in Mid-Atlantic Ridge basalts: *Geochemistry, Geophysics, Geosystems*, v. 4, p. no.1, 20.
- Burnard, P.G., Stuart, F.M., Turner, G., and Oskarsson, N., 1994, Air contamination of basaltic magmas; implications for high  $^3\text{He}/^4\text{He}$  mantle Ar isotopic composition: *Journal of Geophysical Research*, v. 99, no. 9, p. 17,709-717,715.
- Christensen, B.P., Holm, P.M., Jambon, A., and Wilson, J.R., 2001, Helium, argon and lead isotopic composition of volcanics from Santo Antao and Fogo, Cape Verde Islands: *Chemical Geology*, v. 178, no. 1-4, p. 127-142.

- Clark, I.D., and Phillips, R.J., 2000, Geochemical and  $^3\text{He}/^4\text{He}$  evidence for mantle and crustal contributions to geothermal fluids in the western Canadian continental margin: *Journal of Volcanology and Geothermal Research*, v. 104, no. 1-4, p. 261-276.
- Condomines, M., Groenvold, K., Hooker, P.J., Muehlenbachs, K., O'Nions, R.K., Oskarsson, N., and Oxburgh, E.R., 1983, Helium, oxygen, strontium and neodymium isotopic relationships in Icelandic volcanics: *Earth and Planetary Science Letters*, v. 66, p. 125-136.
- Craig, H., and Lupton, J.E., 1976, Primordial neon, helium, and hydrogen in oceanic basalts: *Earth and Planetary Science Letters*, v. 31, no. 3, p. 369-385.
- Darling, W.G., Griesshaber, E., Andrews, J.N., Armannsson, H., and O'Nions, R.K., 1995, The origin of hydrothermal and other gases in the Kenya Rift valley: *Geochimica et Cosmochimica Acta*, v. 59, no. 12, p. 2501-2512.
- DePaolo, D.J., Bryce, J.G., Dodson, A., Shuster, D.L., and Kennedy, B.M., 2000, Isotopic evolution of Mauna Loa and the chemical structure of the Hawaiian plume: *Geochemistry, Geophysics, Geosystems*, v. 2, p. 32.
- Dixon, E.T., 2003, Interpretation of helium and neon isotopic heterogeneity in Icelandic basalts: *Earth and Planetary Science Letters*, v. 206, no. 1-2, p. 83-99.
- Dixon, E.T., Honda, M., McDougall, I., Campbell, I.H., and Sigurdsson, I., 2000, Preservation of near-solar neon isotopic ratios in Icelandic basalts: *Earth and Planetary Science Letters*, v. 180, no. 3-4, p. 309-324.
- Dixon, J.E., Clague, D.A., Wallace, P., and Poreda, R.J., 1997, Volatiles in alkalic basalts from the North Arch volcanic field, Hawaii; extensive degassing of deep submarine-erupted alkalic series lavas: *Journal of Petrology*, v. 38, no. 7, p. 911-936.
- Dodson, A., DePaolo, D.J., and Kennedy, B.M., 1998, Helium isotopes in lithospheric mantle; evidence from Tertiary basalts of the Western USA: *Geochimica et Cosmochimica Acta*, v. 62, no. 23-24, p. 3775-3787.
- Dodson, A., Kennedy, B.M., and DePaolo, D.J., 1997, Helium and neon isotopes in the Imnaha Basalt, Columbia River Basalt Group; evidence for a Yellowstone plume source: *Earth and Planetary Science Letters*, v. 150, no. 3-4, p. 443-451.
- Doucelance, R., Escrig, S., Moreira, M., Gariepy, C., and Kurz, M.D., 2003, Pb-Sr-He isotope and trace element geochemistry of the Cape Verde Archipelago: *Geochimica et Cosmochimica Acta*, v. 67, no. 19, p. 3717-3733.
- Doucet, S., Moreira, M., Weis, D., Scoates, J.S., Giret, A., and Alle?gre, C., 2006, Primitive neon and helium isotopic compositions of high-MgO basalts from the Kerguelen Archipelago, Indian Ocean: *Earth and Planetary Science Letters*, v. 241, no. 1-2, p. 65-79.
- Eiler, J.M., Farley, K.A., and Stolper, E.M., 1998, Correlated helium and lead isotope variations in Hawaiian lavas: *Geochimica et Cosmochimica Acta*, v. 62, no. 11, p. 1977-1984.
- Farley, K.A., Basu, A.R., and Craig, H., 1993, He, Sr and Nd isotopic variations in lavas from the Juan Fernandez Archipelago, SE Pacific: *Contributions to Mineralogy and Petrology*, v. 115, no. 1, p. 75-87.

- Farley, K.A., Natland, J.H., and Craig, H., 1992, Binary mixing of enriched and undegassed (primitive?) mantle components (He, Sr, Nd, Pb) in Samoan lavas: *Earth and Planetary Science Letters*, v. 111, no. 1, p. 183-199.
- Fiebig, J., Chiodini, G., Caliro, S., Rizzo, A., Spangenberg, J., and Hunziker, J.C., 2004, Chemical and isotopic equilibrium between CO<sub>2</sub> and CH<sub>4</sub> in fumarolic gas discharges; generation of CH<sub>4</sub> in arc magmatic-hydrothermal systems: *Geochimica et Cosmochimica Acta*, v. 68, no. 10, p. 2321-2334.
- Fischer, T.P., Giggenbach, W.F., Sano, Y., and Williams, S.N., 1998, Fluxes and sources of volatiles discharged from Kudryavy, a subduction zone volcano, Kurile Islands: *Earth and Planetary Science Letters*, v. 160, no. 1-2, p. 81-96.
- Fischer, T.P., Hilton, D.R., Zimmer, M.M., Shaw, A.M., Sharp, Z.D., and Walker, J.A., 2002, Subduction and recycling of nitrogen along the Central American margin: *Science*, v. 297, no. 5584, p. 1154-1157.
- Fournier, R.O., Kennedy, B.M., Aoki, M., and Thompson, J.M., 1994, Correlation of gold in siliceous sinters with <sup>3</sup>He/<sup>4</sup>He in hot spring waters of Yellowstone National Park: *Geochimica et Cosmochimica Acta*, v. 58, no. 24, p. 5401-5419.
- Franz, G., Steiner, G., Volker, F., Pudlo, D., and Hammerschmidt, K., 1999, Plume related alkaline magmatism in central Africa; the Meidob Hills (W Sudan): *Chemical Geology*, v. 157, no. 1-2, p. 27-47.
- Gamo, T., Chiba, H., Yamanaka, T., Okudaira, T., Hashimoto, J., Tsuchida, S., Ishibashi, J.-i., Kataoka, S., Tsunogai, U., Okamura, K., Sano, Y., and Shinjo, R., 2001, Chemical characteristics of newly discovered black smoker fluids and associated hydrothermal plumes at the Rodriguez triple junction, Central Indian Ridge: *Earth and Planetary Science Letters*, v. 193, no. 3-4, p. 371-379.
- Gasparon, M., Hilton, D.R., and Varne, R., 1994, Crustal contamination processes traced by helium isotopes; examples from the Sunda Arc, Indonesia: *Earth and Planetary Science Letters*, v. 126, no. 1-3, p. 15-22.
- Georgen, J.E., Kurz, M.D., Dick, H.J.B., and Lin, J., 2003, Low <sup>3</sup>He/<sup>4</sup>He ratios in basalt glasses from the western Southwest Indian Ridge (10 degrees -24 degrees E): *Earth and Planetary Science Letters*, v. 206, no. 3-4, p. 509-528.
- Giggenbach, W.F., and Poreda, R.J., 1993, Helium isotopic and chemical composition of gases from volcanic-hydrothermal systems in the Philippines: *Geothermics*, v. 22, no. 5-6, p. 369-380.
- Giggenbach, W.F., Sano, Y., and Wakita, H., 1993, Isotopic composition of helium, and CO<sub>2</sub> and CH<sub>4</sub> contents in gases produced along the New Zealand part of a convergent plate boundary: *Geochimica et Cosmochimica Acta*, v. 57, no. 14, p. 3427-3455.
- Goff, F., McMurtry, G.M., Counce, D., Simac, J.A., Roldan-Manzo, A.R., and Hilton, D.R., 2000, Contrasting hydrothermal activity at Sierra Negra and Alcedo volcanoes, Galapagos Archipelago, Ecuador: *Bulletin of Volcanology*, v. 62, no. 1, p. 34-52.
- Grachev, A.F., 1998, The Khamar-Daban Ridge as a hotspot of the Baikal Rift from data of chemical geodynamics: *Izvestiya, Physics of the Solid Earth*, v. 34, no. 3, p. 175-200.

- Graham, D., Lupton, J.E., Albarede, F., and Condomines, M., 1990, Extreme temporal homogeneity of helium isotopes at Piton de la Fournaise, Reunion Island: Nature, v. 347, no. 6293, p. 545-548.
- Graham, D.W., 1994, Helium isotope variations along mid-ocean ridges; mantle heterogeneity and melt generation effects, *in* Harte, B., ed., Mineralogical Magazine, p. 347-348.
- Graham, D.W., Allard, P., Kilburn, C.R.J., Spera, F.J., and Lupton, J.E., 1993a, Helium isotopes in some historical lavas from Mount Vesuvius: Journal of Volcanology and Geothermal Research, v. 58, no. 1-4, p. 359-366.
- Graham, D.W., Castillo, P.R., Lupton, J.E., and Batiza, R., 1996, Correlated He and Sr isotope ratios in South Atlantic near-ridge seamounts and implications for mantle dynamics: Earth and Planetary Science Letters, v. 144, no. 3-4, p. 491-503.
- Graham, D.W., Christie, D.M., Harpp, K.S., and Lupton, J.E., 1993b, Mantle plume helium in submarine basalts from the Galapagos Platform: Science, v. 262, no. 5142, p. 2023-2026.
- Graham, D.W., Humphris, S.E., Jenkins, W.J., and Kurz, M.D., 1992, Helium isotope geochemistry of some volcanic rocks from Saint Helena: Earth and Planetary Science Letters, v. 110, no. 1-4, p. 121-131.
- Graham, D.W., Johnson, K.T.M., Priebe, L.D., and Lupton, J.E., 1999, Hotspot-ridge interaction along the Southeast Indian Ridge near Amsterdam and St. Paul islands; helium isotope evidence: Earth and Planetary Science Letters, v. 167, no. 3-4, p. 297-310.
- Graham, D.W., Larsen, L.M., Hanan, B.B., Storey, M., Pedersen, A.K., and Lupton, J.E., 1998, Helium isotope composition of the early Iceland mantle plume inferred from the Tertiary picrites of West Greenland: Earth and Planetary Science Letters, v. 160, no. 3-4, p. 241-255.
- Graham, D.W., Zindler, A., Kurz, M.D., Jenkins, W.J., Batiza, R., and Staudigel, H., 1988, He, Pb, Sr and Nd isotope constraints on magma genesis and mantle heterogeneity beneath young Pacific seamounts: Contributions to Mineralogy and Petrology, v. 99, no. 4, p. 446-463.
- Griesshaber, E., O'Nions, R.K., and Oxburgh, E.R., 1992, Helium and carbon isotope systematics in crustal fluids from the Eifel, the Rhine Graben and Black Forest, F.R.G: Chemical Geology, v. 99, no. 4, p. 213-235.
- Gulec, N., Hilton, D.R., and Mutlu, H., 2002, Helium isotope variations in Turkey; relationship to tectonics, volcanism and recent seismic activities: Chemical Geology, v. 187, no. 1-2, p. 129-142.
- Hanyu, T., Clague, D.A., Kaneoka, I., Dunai, T.J., and Davies, G.R., 2005, Noble gas systematics of submarine alkalic lavas near the Hawaiian Hotspot: Chemical Geology, v. 214, no. 1-2, p. 135-155.
- Hanyu, T., Dunai, T.J., Davies, G.R., Kaneoka, I., Nohda, S., and Uto, K., 2001, Noble gas study of the Reunion hotspot; evidence for distinct less-degassed mantle sources: Earth and Planetary Science Letters, v. 193, no. 1-2, p. 83-98.
- Hanyu, T., Kaneoka, I., and Nagao, K., 1999, Noble gas study of HIMU and EM ocean island basalts in the Polynesian region: Geochimica et Cosmochimica Acta, v. 63, no. 7-8, p. 1181-1201.

- Harrison, D., Burnard, P., and Turner, G., 1999, Noble gas behaviour and composition in the mantle; constraints from the Iceland Plume: *Earth and Planetary Science Letters*, v. 171, no. 2, p. 199-207.
- Hauri, E.H., 1996, Major-element variability in the Hawaiian mantle plume: *Nature*, v. 382, no. 6590, p. 415-419.
- Hearn, E.H., Kennedy, B.M., and Truesdell, A.H., 1990, Coupled variations in helium isotopes and fluid chemistry; Shoshone Geyser Basin, Yellowstone National Park: *Geochimica et Cosmochimica Acta*, v. 54, no. 11, p. 3103-3113.
- Hilton, D.R., 1996, The helium and carbon isotope systematics of a continental geothermal system: Results from monitoring studies at Long Valley caldera (California, U.S.A.): *Chemical Geology*, v. 127, no. 4, p. 269-295.
- Hilton, D.R., Barling, J., and Wheller, G.E., 1995, Effect of shallow-level contamination on the helium isotope systematics of ocean-island lavas: *Nature*, v. 373, no. 6512, p. 330-333.
- Hilton, D.R., and Craig, H., 1989, A helium isotope transect along the Indonesian archipelago: *Nature*, v. 342, no. 6252, p. 906-908.
- Hilton, D.R., Gronvold, K., Macpherson, C.G., and Castillo, P.R., 1999, Extreme  $^3\text{He}/^4\text{He}$  ratios in northwest Iceland: Constraining the common component in mantle plumes: *Earth and Planetary Science Letters*, v. 173, no. 1-2, p. 53-60.
- Hilton, D.R., Gronvold, K., Sveinbjornsdottir, A.E., and Hammerschmidt, K., 1998a, Helium isotope evidence for off-axis degassing of the Icelandic hotspot: *Chemical Geology*, v. 149, no. 3-4, p. 173-187.
- Hilton, D.R., Hammerschmidt, K., Loock, G., and Friedrichsen, H., 1993a, Helium and argon isotope systematics of the central Lau Basin and Valu Fa Ridge; evidence of crust/mantle interactions in a back-arc basin: *Geochimica et Cosmochimica Acta*, v. 57, no. 12, p. 2819-2841.
- Hilton, D.R., Hammerschmidt, K., Teufel, S., and Friedrichsen, H., 1993b, Helium isotope characteristics of Andean geothermal fluids and lavas: *Earth and Planetary Science Letters*, v. 120, no. 3-4, p. 265-281.
- Hilton, D.R., Hoogewerff, J.A., van Bergen, M.J., and Hammerschmidt, K., 1992, Mapping magma sources in the East Sunda-Banda arcs, Indonesia; constraints from helium isotopes: *Geochimica et Cosmochimica Acta*, v. 56, no. 2, p. 851-859.
- Hilton, D.R., Macpherson, C.G., and Elliott, T.R., 2000a, Helium isotope ratios in mafic phenocrysts and geothermal fields from La Palma, the Canary Islands (Spain); implications for HIMU mantle sources: *Geochimica et Cosmochimica Acta*, v. 64, no. 12, p. 2119-2132.
- Hilton, D.R., McMurtry, G.M., and Goff, F., 1998b, Large variations in vent fluid  $\text{CO}_2$   $^3\text{He}$  ratios signal rapid changes in magma chemistry at Loihi Seamount, Hawaii: *Nature*, v. 396, no. 6709, p. 359-362.
- Hilton, D.R., McMurtry, G.M., and Kreulen, R., 1997, Evidence for extensive degassing of the Hawaiian mantle plume from helium-carbon relationships at Kilauea volcano: *Geophysical Research Letters*, v. 24, no. 23, p. 3065-3068.
- Hilton, D.R., Thirlwall, M.F., Taylor, R.N., Murton, B.J., and Nichols, A., 2000b, Controls on magmatic degassing along the Reykjanes Ridge with implications for the helium paradox: *Earth and Planetary Science Letters*, v. 183, no. 1-2, p. 43-50.

- Hiyagon, H., Ozima, M., Marty, B., Zashu, S., and Sakai, H., 1992, Noble gases in submarine glasses from mid-oceanic ridges and Loihi Seamount; constraints on the early history of the Earth: *Geochimica et Cosmochimica Acta*, v. 56, no. 3, p. 1301-1316.
- Hoke, L., Hilton, D.R., Lamb, S.H., Hammerschmidt, K., and Friedrichsen, H., 1994,  $^{3}\text{He}$  evidence for a wide zone of active mantle melting beneath the Central Andes: *Earth and Planetary Science Letters*, v. 128, no. 3-4, p. 341-355.
- Hoke, L., Poreda, R., Reay, A., and Weaver, S.D., 2000, The subcontinental mantle beneath southern New Zealand, characterised by helium isotopes in intraplate basalts and gas-rich springs: *Geochimica et Cosmochimica Acta*, v. 64, no. 14, p. 2489-2507.
- Honda, M., McDougall, I., Patterson, D.B., Doulgeris, A., and Clague, D.A., 1991, Possible solar noble-gas component in Hawaiian basalts: *Nature*, v. 349, no. 6305, p. 149-151.
- , 1993a, Noble gases in submarine pillow basalt glasses from Loihi and Kilauea, Hawaii: a solar component in the Earth: *Geochimica et Cosmochimica Acta*, v. 57, no. 4, p. 859-874.
- Honda, M., Patterson, D.B., McDougall, I., and Falloon, T.J., 1993b, Noble gases in submarine pillow basalt glasses from the Lau Basin; detection of a solar component in backarc basin basalts: *Earth and Planetary Science Letters*, v. 120, no. 3-4, p. 135-148.
- Hopp, J., and Trieloff, M., 2005, Refining the noble gas record of the Re?union mantle plume source: Implications on mantle geochemistry: *Earth and Planetary Science Letters*, v. 240, no. 3-4, p. 573-588.
- Hulston, J.R., Hilton, D.R., and Kaplan, I.R., 2001, Helium and carbon isotope systematics of natural gases from Taranaki Basin, New Zealand: *Applied Geochemistry*, v. 16, no. 4, p. 419-436.
- Hulston, J.R., and Lupton, J.E., 1996, Helium isotope studies of geothermal fields in the Taupo volcanic zone, New Zealand: *Journal of Volcanology and Geothermal Research*, v. 74, no. 3-4, p. 297-321.
- Igarashi, G., Ozima, M., Ishibashi, J., Gamo, T., Sakai, H., Nojiri, Y., and Kawai, T., 1992, Mantle helium flux from the bottom of Lake Mashu, Japan: *Earth and Planetary Science Letters*, v. 108, no. 1-3, p. 11-18.
- Ikeda, Y., Nagao, K., and Kagami, H., 2001, Effects of recycled materials involved in a mantle source beneath the Southwest Japan Arc region; evidence from noble gas, Sr, and Nd isotopic systematics: *Chemical Geology*, v. 175, no. 3-4, p. 509-522.
- Ishibashi, J., Sano, Y., Wakita, H., Gamo, T., Tsutsumi, M., and Sakai, H., 1995, Helium and carbon geochemistry of hydrothermal fluids from the mid-Okinawa Trough back arc basin, southwest of Japan: *Chemical Geology*, v. 123, no. 1-4, p. 1-15.
- Ishibashi, J., Wakita, H., Nojiri, Y., Grimaud, D., Jean-Baptiste, P., Gamo, T., Auzende, J.-M., and Urabe, T., 1994, Helium and carbon geochemistry of hydrothermal fluids from the North Fiji Basin spreading ridge (Southwest Pacific): *Earth and Planetary Science Letters*, v. 128, no. 3-4, p. 183-197.
- Jaffe, L.A., Hilton, D.R., Fischer, T.P., and Hartono, U., 2004, Tracing magma sources in an arc-arc collision zone; helium and carbon isotope and relative abundance systematics of the Sangihe Arc, Indonesia.

- Jambon, A., Weber, H.W., and Begemann, F., 1985, Helium and argon from an Atlantic MORB glass; concentration, distribution and isotopic composition: *Earth and Planetary Science Letters*, v. 73, no. 2-4, p. 255-268.
- Jean-Baptiste, P., and Fouquet, Y., 1996, Abundance and isotopic composition of helium in hydrothermal sulfides from the East Pacific Rise at 13 degrees N: *Geochimica et Cosmochimica Acta*, v. 60, no. 1, p. 87-93.
- Kaneoka, I., and Takaoka, N., 1978, Excess  $^{129}\text{Xe}$  and high  $^3\text{He}/^4\text{He}$  ratios in olivine phenocrysts of Kapuho Lava and xenolithic dunites from Hawaii: *Earth and Planetary Science Letters*, v. 39, no. 3, p. 382-386.
- Kaneoka, I., Takaoka, N., Clague, D.A., and Craig, H., 1983, Noble gas systematics for coexisting glass and olivine crystals in basalts and dunite xenoliths from Loihi Seamount, *Earth and Planetary Science Letters*, vol.66, p. 427-437.
- Kaneoka, I., Takaoka, N., and Upton, B.G.J., 1986, Noble gas systematics in basalts and a dunite nodule from Reunion and Grand Comoro islands, Indian Ocean: *Chemical Geology*; Isotope Geoscience Section, v. 59, no. 1, p. 35-42.
- Kennedy, B.M., Hiyagon, H., and Reynolds, J.H., 1991, Noble gases from Honduras geothermal sites: *Journal of Volcanology and Geothermal Research*, v. 45, no. 1-2, p. 29-39.
- Kennedy, B.M., Reynolds, J.H., Smith, S.P., Truesdell, A.H., and Anonymous, 1987, Helium isotopes; Lower Geyser Basin, Yellowstone National Park: *Journal of Geophysical Research*, v. 92, no. 12, p. 12,477-12,489.
- Kingsley, R.H., and Schilling, J.-G., 1995, Carbon in Mid-Atlantic Ridge basalt glasses from 28 degrees N to 63 degrees N; evidence for a carbon-enriched Azores mantle plume: *Earth and Planetary Science Letters*, v. 129, no. 1-4, p. 31-53.
- Kirstein, L.A., and Timmerman, M.J., 2000, Evidence of the proto-Iceland plume in northwestern Ireland at 42 Ma from helium isotopes: *Journal of the Geological Society of London*, v. 157, no. 5, p. 923-927.
- Kita, I., Nagao, K., Taguchi, S., Nitta, K., and Hasegawa, H., 1993, Emission of magmatic He with different  $^3\text{He}/^4\text{He}$  ratios from the Unzen volcanic area, Japan: *Geochemical Journal*, v. 27, no. 4-5, p. 251-259.
- Krylov, A.Y., Mamyrin, B.A., Khabarin, L.V., Mazina, T.I., and Silin, Y.I., 1974, Izotopy gelya v korennyykh porodakh dna okeanov. Helium isotopes in ocean-floor bedrock: *Geokhimiya*, no. 8, p. 1220-1225.
- Kumagai, H., Dick, H.J.B., and Kaneoka, I., 2003, Noble gas signatures of abyssal gabbros and peridotites at an Indian Ocean core complex.
- Kumagai, H., and Kaneoka, I., 1998, Variations of noble gas abundances and isotope ratios in a single MORB pillow: *Geophysical Research Letters*, v. 25, no. 20, p. 3891-3894.
- , 2005, Noble gas signatures around the Rodriguez Triple Junction in the Indian Ocean: Constraints on magma genesis in a ridge system: *Geochimica et Cosmochimica Acta*, v. 69, no. 23, p. 5567-5583.
- Kurz, M.D., Curtice, J., Lott, D.E., III, and Solow, A., 2004, Rapid helium isotopic variability in Mauna Kea shield lavas from the Hawaiian Scientific Drilling Project.

- Kurz, M.D., Garcia, M.O., Frey, F.A., and O'Brien, P.A., 1987, Temporal helium isotopic variations within Hawaiian volcanoes; basalts from Mauna Loa and Haleakala: *Geochimica et Cosmochimica Acta*, v. 51, no. 11, p. 2905-2914.
- Kurz, M.D., and Geist, D., 1999, Dynamics of the Galapagos hotspot from helium isotope geochemistry, in Shimizu, N., ed., *Geochimica et Cosmochimica Acta*, p. 4139-4156.
- Kurz, M.D., and Jenkins, W.J., 1981, The distribution of helium in oceanic basalt glasses: *Earth and Planetary Science Letters*, v. 53, no. 1, p. 41-54.
- Kurz, M.D., Jenkins, W.J., and Hart, S.R., 1982a, Helium isotopic systematics of oceanic islands and mantle heterogeneity: *Nature*, v. 297, no. 5861, p. 43-47.
- Kurz, M.D., Jenkins, W.J., Hart, S.R., Clague, D.A., and Craig, H., 1983, Helium isotopic variations in volcanic rocks from Loihi Seamount and the Island of Hawaii, *Earth and Planetary Science Letters*, vol.66, p. 388-406.
- Kurz, M.D., Jenkins, W.J., Schilling, J.G., and Hart, S.R., 1982b, Helium isotopic variations in the mantle beneath the central North Atlantic Ocean: *Earth and Planetary Science Letters*, v. 58, no. 1, p. 1-14.
- Kurz, M.D., and Kammer, D.P., 1991, Isotopic evolution of Mauna Loa Volcano: *Earth and Planetary Science Letters*, v. 103, no. 1-4, p. 257-269.
- Kurz, M.D., Kenna, T.C., Kammer, D.P., Rhodes, J.M., and Garcia, M.O., 1995, Isotopic evolution of Mauna Loa Volcano; a view from the submarine southwest rift zone: *Geophysical Monograph*, v. 92, p. 289-306.
- Kurz, M.D., Kenna, T.C., Lassiter, J.C., and DePaolo, D.J., 1996, Helium isotopic evolution of Mauna Kea Volcano; first results from the 1-km drill core: *Journal of Geophysical Research*, v. 101, no. 5, p. 11,781-711,791.
- Kurz, M.D., le Roex, A.P., and Dick, H.J.B., 1998, Isotope geochemistry of the oceanic mantle near the Bouvet triple junction: *Geochimica et Cosmochimica Acta*, v. 62, no. 5, p. 841-852.
- Kurz, M.D., Meyer, P.S., and Sigurdsson, H., 1985, Helium isotopic systematics within the neovolcanic zones of Iceland: *Earth and Planetary Science Letters*, v. 74, no. 4, p. 291-305.
- Kurz, M.D., Moreira, M., Curtice, J., Lott, D.E., III, Mahoney, J.J., and Sinton, J.M., 2005, Correlated helium, neon, and melt production on the super-fast spreading East Pacific Rise near 17 degrees S: *Earth and Planetary Science Letters*, v. 232, no. 1-2, p. 125-142.
- Lewicki, J.L., Fischer, T., and Williams, S.N., 2000, Chemical and isotopic compositions of fluids at Cumbal Volcano, Colombia; evidence for magmatic contribution: *Bulletin of Volcanology*, v. 62, no. 4-5, p. 347-361.
- Lupton, J.E., Baker, E.T., and Massoth, G.J., 1989, Variable  ${}^3\text{He}/\text{heat}$  ratios in submarine hydrothermal systems: evidence from two plumes over the Juan de Fuca ridge: *Nature*, v. 337, no. 6203, p. 161-164.
- Lupton, J.E., and Craig, H., 1975, Excess  ${}^3\text{He}$  in oceanic basalts; evidence for terrestrial primordial helium: *Earth and Planetary Science Letters*, v. 26, no. 2, p. 133-139.
- Lupton, J.E., Graham, D.W., Delaney, J.R., and Johnson, H.P., 1993, Helium isotope variations in Juan de Fuca Ridge basalts: *Geophysical Research Letters*, v. 20, no. 17, p. 1851-1854.

- Lupton, J.E., Klinkhammer, G.P., Normark, W.R., Haymon, R., Macdonald, K.C., Weiss, R.F., and Craig, H., 1980, Helium-3 and manganese at the 21 degrees N East Pacific Rise hydrothermal site: *Earth and Planetary Science Letters*, v. 50, no. 1, p. 115-127.
- Macpherson, C.G., Hilton, D.R., Day, J.M.D., Lowry, D.C., and Gronvold, K., 2005a, High  $^3\text{He}/^4\text{He}$ , depleted mantle and low delta  $^{18}\text{O}$ , recycled oceanic lithosphere in the source of central Iceland magmatism: *Earth and Planetary Science Letters*, v. 233, no. 3-4, p. 411-427.
- Macpherson, C.G., Hilton, D.R., Mertz, D.F., and Dunai, T.J., 2005b, Sources, degassing, and contamination of CO<sub>2</sub>, H<sub>2</sub>O, He, Ne, and Ar in basaltic glasses from Kolbeinsey Ridge, North Atlantic: *Geochimica et Cosmochimica Acta*, v. 69, no. 24, p. 5729-5746.
- Macpherson, C.G., Hilton, D.R., Sinton, J.M., Poreda, R.J., and Craig, H., 1998, High  $^3\text{He}/^4\text{He}$  ratios in the Manus backarc basin; implications for mantle mixing and the origin of plumes in the Western Pacific Ocean: *Geology*, v. 26, no. 11, p. 1007-1010.
- Mahoney, J.J., Graham, D.W., Christie, D.M., Johnson, K.T.M., Hall, L.S., and Vonderhaar, D.L., 2002, Between a hotspot and a cold spot; isotopic variation in the Southeast Indian Ridge asthenosphere, 86 degrees E-118 degrees E: *Journal of Petrology*, v. 43, no. 7, p. 1155-1176.
- Mahoney, J.J., Natland, J.H., White, W.M., Poreda, R., Bloomer, S.H., Fisher, R.L., and Baxter, A.N., 1989, Isotopic and geochemical provinces of the western Indian Ocean spreading centers: *Journal of Geophysical Research*, v. 94, no. 4, p. 4033-4052.
- Mahoney, J.J., Sinton, J.M., Kurz, M.D., Macdougall, J.D., Spencer, K.J., and Lugmair, G.W., 1994, Isotope and trace element characteristics of a super-fast spreading ridge; East Pacific Rise, 13-23 degrees S: *Earth and Planetary Science Letters*, v. 121, no. 1-2, p. 173-193.
- Marty, B., Appora, I., Barrat, J.A.A., Deniel, C., Vellutini, P., and Vidal, P., 1993, He, Ar, Sr, Nd and Pb isotopes in volcanic rocks from Afar: evidence for a primitive mantle component and constraints on magmatic sources: *Geochemical Journal*, v. 27, no. 4-5, p. 219-228.
- Marty, B., Gunnlaugsson, E., Jambon, A., Oskarsson, N., Ozima, M., Pineau, F., and Torssander, P., 1991, Gas geochemistry of geothermal fluids, the Hengill area, southwest rift zone of Iceland: *Chemical Geology*, v. 91, no. 3, p. 207-225.
- Marty, B., Jambon, A., and Sano, Y., 1989, Helium isotopes and CO<sub>2</sub> in volcanic gases of Japan: *Chemical Geology*, v. 76, no. 1-2, p. 25-40.
- Marty, B., and Lussiez, P., 1994, Constraints on rare gas partition coefficients from analysis of olivine-glass from a picritic mid-ocean ridge basalt; reply [modified]: *Chemical Geology*, v. 112, no. 1-2, p. 122-127.
- Marty, B., and Ozima, M., 1986, Noble gas distribution in oceanic basalt glasses: *Geochimica et Cosmochimica Acta*, v. 50, no. 6, p. 1093-1097.
- Marty, B., Trull, T., Lussiez, P., Basile, I., and Tanguy, J.C., 1994, He, Ar, O, Sr and Nd isotope constraints on the origin and evolution of Mount Etna magmatism: *Earth & Planetary Science Letters*, v. 126, no. 1-3, p. 23-39.

- Marty, B., Upton, B.G.J., and Ellam, R.M., 1998, Helium isotopes in early Tertiary basalts, northeast Greenland: evidence for 58 Ma plume activity in the North Atlantic-Iceland volcanic province: *Geology*, v. 26, no. 5, p. 407-410.
- Marty, B., Zashu, S., and Ozima, M., 1983, Two noble gas components in a Mid-Atlantic Ridge basalt: *Nature*, v. 302, no. 5905, p. 238-240.
- Marty, B., and Zimmermann, L., 1999, Volatiles (He, C, N, Ar) in mid-ocean ridge basalts: Assessment of shallow-level fractionation and characterization of source composition: *Geochimica et Cosmochimica Acta*, v. 63, no. 21, p. 3619-3633.
- Matsumoto, T., Honda, M., McDougall, I., and O'Reilly, S.Y., 1998, Noble gases in anhydrous lherzolites from the Newer Volcanics, southeastern Australia; a MORB-like reservoir in the subcontinental mantle: *Geochimica et Cosmochimica Acta*, v. 62, no. 14, p. 2521-2533.
- Matsumoto, T., Seta, A., Matsuda, J.-i., Takebe, M., Chen, Y., and Arai, S., 2002, Helium in the Archean komatiites revisited; significantly high  $^3\text{He}/^4\text{He}$  ratios revealed by fractional crushing gas extraction: *Earth and Planetary Science Letters*, v. 196, no. 3-4, p. 213-225.
- Moreira, M., and Alle?gre, C.J., 2002, Rare gas systematics on Mid Atlantic ridge (37-40°N): *Earth and Planetary Science Letters*, v. 198, no. 3-4, p. 401-416.
- Moreira, M., Blusztajn, J., Curtice, J., Hart, S., Dick, H., and Kurz, M.D., 2003, He and Ne isotopes in oceanic crust: Implications for noble gas recycling in the mantle: *Earth and Planetary Science Letters*, v. 216, no. 4, p. 635-643.
- Moreira, M., Doucelance, R., Kurz, M.D., Dupre, B., and Alle?gre, C.J., 1999, Helium and lead isotope geochemistry of the Azores archipelago: *Earth and Planetary Science Letters*, v. 169, no. 1-2, p. 189-205.
- Moreira, M., Staudacher, T., Sarda, P., Schilling, J.G., and Allegre, C.J., 1995, A primitive plume neon component in MORB: the Shona ridge-anomaly, South Atlantic (51-52°S): *Earth & Planetary Science Letters*, v. 133, no. 3-4, p. 367-377.
- Moreira, M., Valbracht, P.J., Staudacher, T., and Allegre, C.J., 1996, Rare gas systematics in Red Sea ridge basalts: *Geophysical Research Letters*, v. 23, no. 18, p. 2453-2456.
- Motyka, R.J., Moorman, M.A., and Poreda, R., 1982, Fluid geochemistry of Hot Springs Bay Vale, Akutan Island, Alaska, in *Transactions - Geothermal Resources Council*, San Diego, CA, USA, *Geothermal Energy: Turn on the Power!*, Transactions, Volume 6, Geothermal Resources Council, 1982 Annual Meeting., Geothermal Resources Council, p. 103-106.
- Motyka, R.J., Poreda, R.J., and Jeffrey, A.W.A., 1989, Geochemistry, isotopic composition, and origin of fluids emanating from mud volcanoes in the Copper River basin, Alaska: *Geochimica et Cosmochimica Acta*, v. 53, no. 1, p. 29-41.
- Mukhopadhyay, S., Lassiter, J.C., Farley, K.A., and Bogue, S.W., 2003, Geochemistry of Kauai shield-stage lavas: Implications for the chemical evolution of the Hawaiian plume: *Geochemistry, Geophysics, Geosystems*, v. 4, p. no.1, 32.
- Nakai, S.i., Wakita, H., Nuccio, M.P., and Italiano, F., 1997, MORB-type neon in an enriched mantle beneath Etna, Sicily: *Earth and Planetary Science Letters*, v. 153, no. 1-2, p. 57-66.

- Niedermann, S., and Bach, W., 1998, Anomalously nucleogenic neon in North Chile Ridge basalt glasses suggesting a previously degassed mantle source: *Earth and Planetary Science Letters*, v. 160, no. 3-4, p. 447-462.
- Niedermann, S., Bach, W., and Erzinger, J., 1997, Noble gas evidence for a lower mantle component in MORBs from the southern East Pacific Rise; decoupling of helium and neon isotope systematics: *Geochimica et Cosmochimica Acta*, v. 61, no. 13, p. 2697-2715.
- Nier, A.O., Schlutter, D.J., and Brownlee, D.E., 1990, Helium and neon isotopes in deep Pacific Ocean sediments: *Geochimica et Cosmochimica Acta*, v. 54, no. 1, p. 173-182.
- Nishio, Y., Ishii, T., Gamo, T., and Sano, Y., 1999, Volatile element isotopic systematics of the Rodrigues triple junction Indian Ocean MORB; implications for mantle heterogeneity: *Earth and Planetary Science Letters*, v. 170, no. 3, p. 241-253.
- Nishio, Y., Sasaki, S., Gamo, T., Hiyagon, H., and Sano, Y., 1998, Carbon and helium isotope systematics of North Fiji Basin basalt glasses; carbon geochemical cycle in the subduction zone: *Earth and Planetary Science Letters*, v. 154, no. 1-4, p. 127-138.
- Notsu, K., Nakai, S., Igarashi, G., Ishibashi, J., Mori, T., Suzuki, M., and Wakita, H., 2001, Spatial distribution and temporal variation of  ${}^3\text{He}/{}^4\text{He}$  in hot spring gas released from Unzen volcanic area, Japan: *Journal of Volcanology and Geothermal Research*, v. 111, no. 1-4, p. 89-98.
- Ozima, M., and Zashu, S., 1983, Noble gases in submarine pillow volcanic glasses: *Earth and Planetary Science Letters*, v. 62, no. 1, p. 24-40.
- Parello, F., Allard, P., D'Alessandro, W., Federico, C., Jean-Baptiste, P., and Catani, O., 2000, Isotope geochemistry of Pantelleria volcanic fluids, Sicily Channel Rift; a mantle volatile end-member for volcanism in southern Europe: *Earth and Planetary Science Letters*, v. 180, no. 3-4, p. 325-339.
- Patterson, D.B., Farley, K.A., and McInnes, B.I.A., 1997, Helium isotopic composition of the Tabar-Lihir-Tanga-Feni island arc, Papua New Guinea: *Geochimica et Cosmochimica Acta*, v. 61, no. 12, p. 2485-2496.
- Patterson, D.B., Honda, M., and McDougall, I., 1994, Noble gases in mafic phenocrysts and xenoliths from New Zealand: *Geochimica et Cosmochimica Acta*, v. 58, no. 20, p. 4411-4427.
- Polyak, B.G., Pleshakov, A.M., Pukhov, V.V., Shukolyukov, Y.A., and Lokhov, K.I., 1995, Major volatiles and helium isotopes in Site 864 basalt glasses: *Proceedings of the Ocean Drilling Program, Scientific Results*, v. 142, p. 31-36.
- Porcelli, D.R., O'Nions, R.K., and O'Reilly, S.Y., 1986, Helium and strontium isotopes in ultramafic xenoliths: *Chemical Geology*, v. 54, no. 3-4, p. 237-249.
- Poreda, R., 1985, Helium-3 and deuterium in back-arc basalts: Lau Basin and the Mariana Trough: *Earth & Planetary Science Letters*, v. 73, no. 2-4, p. 244-254.
- Poreda, R., and Craig, H., 1989, Helium isotope ratios in Circum-Pacific volcanic arcs: *Nature*, v. 338, no. 6215, p. 473-478.
- Poreda, R., Schilling, J.G., and Craig, H., 1986, Helium and hydrogen isotopes in ocean-ridge basalts north and south of Iceland: *Earth and Planetary Science Letters*, v. 78, no. 1, p. 1-17.

- Poreda, R.J., and Craig, H., 1992, He and Sr isotopes in the Lau Basin mantle; depleted and primitive mantle components: *Earth and Planetary Science Letters*, v. 113, no. 4, p. 487-493.
- Poreda, R.J., Craig, H., Arnorsson, S., and Welhan, J.A., 1992, Helium isotopes in Icelandic geothermal systems; I,  $^3\text{He}$ , gas chemistry, and  $^{13}\text{C}$  relations: *Geochimica et Cosmochimica Acta*, v. 56, no. 12, p. 4221-4228.
- Poreda, R.J., Schilling, J.G., and Craig, H., 1993, Helium isotope ratios in Easter Microplate basalts: *Earth and Planetary Science Letters*, v. 119, no. 3, p. 319-329.
- Reid, M.R., and Graham, D.W., 1996, Resolving lithospheric and sub-lithospheric contributions to helium isotope variations in basalts from the Southwestern US: *Earth and Planetary Science Letters*, v. 144, no. 1-2, p. 213-222.
- Revillon, S., Chauvel, C., Arndt, N.T., Pik, R., Martineau, F., Fourcade, S., and Marty, B., 2002, Heterogeneity of the Caribbean Plateau mantle source; Sr, O and He isotopic compositions of olivine and clinopyroxene from Gorgona Island: *Earth and Planetary Science Letters*, v. 205, no. 1-2, p. 91-106.
- Richter, D.H., Symonds, R.B., Rosenkrans, D.S., McGimsey, R.G., Evans, W.C., and Poreda, R.J., 1998, activity of Shrub mud volcano, Wrangell-St. Elias National Park and Preserve, south-central Alaska OF 98-0128p. 13.
- Rison, W., Craig, H., and Craig, H., 1983, Helium isotopes and mantle volatiles in Loihi Seamount and Hawaiian Island basalts and xenoliths, *Earth and Planetary Science Letters*, vol.66, p. 407-426.
- Roden, M.F., Trull, T., Hart, S.R., and Frey, F.A., 1994, New He, Nd, Pb, and Sr isotopic constraints on the constitution of the Hawaiian plume; results from Koolau Volcano, Oahu, Hawaii, USA: *Geochimica et Cosmochimica Acta*, v. 58, no. 5, p. 1431-1440.
- Sakamoto, M., Sano, Y., and Wakita, H., 1992,  $^3\text{He}/^4\text{He}$  ratio distribution in and around the Hakone volcano: *Geochemical Journal*, v. 26, no. 4, p. 189-195.
- Sano, Y., 1990, Helium and carbon fluxes in Lake Nyos, Cameroon: constraint on next gas burst: *Earth & Planetary Science Letters*, v. 99, no. 4, p. 303-314.
- Sano, Y., Gamo, T., Notsu, K., and Wakita, H., 1995a, Secular variations of carbon and helium isotopes at Izu-Oshima volcano, Japan: *Journal of Volcanology & Geothermal Research*, v. 64, no. 1-2, p. 83-94.
- Sano, Y., Gamo, T., and Williams, S.N., 1997, Secular variations of helium and carbon isotopes at Galeras volcano, Colombia: *Journal of Volcanology and Geothermal Research*, v. 77, no. 1-4, p. 255-265.
- Sano, Y., Hirabayashi, J., Oba, T., and Gamo, T., 1994, Carbon and helium isotopic ratios at Kusatsu-Shirane volcano, Japan: *Applied Geochemistry*, v. 9, no. 4, p. 371-377.
- Sano, Y., Nakamura, Y., Notsu, K., and Wakita, H., 1988, Influence of volcanic eruptions on helium isotope ratios in hydrothermal systems induced by volcanic eruptions (Japan): *Geochimica et Cosmochimica Acta*, v. 52, no. 5, p. 1305-1308.
- Sano, Y., Nakamura, Y., Wakita, H., and Ishii, T., 1986a, Light noble gases in basalt glasses from Mariana Trough: *Geochimica et Cosmochimica Acta*, v. 50, no. 11, p. 2429-2432.
- Sano, Y., Nakamura, Y., Wakita, H., Notsu, K., Kobayashi, Y., Sato, M., Matsuo, S., and King, C.-Y., 1986b,  $^3\text{He}/^4\text{He}$  ratio anomalies associated with the 1984 western

- Nagano earthquake; possibly induced by a diapiric magma, *Journal of Geophysical Research*, p. 12,291-212,295.
- Sano, Y., Nakamura, Y., Wakita, H., Urabe, A., and Tominaga, T., 1984, Helium-3 emission related to volcanic activity: *Science*, v. 224, no. 4645, p. 150-151.
- Sano, Y., Nishio, Y., Gamo, T., Jambon, A., and Marty, B., 1998a, Noble gas and carbon isotopes in Mariana Trough basalt glasses: *Applied Geochemistry*, v. 13, no. 4, p. 441-449.
- Sano, Y., Nishio, Y., Sasaki, S., Gamo, T., and Nagao, K., 1998b, Helium and carbon isotope systematics at Ontake volcano, Japan: *Journal of Geophysical Research*, v. 103, no. 10, p. 23863-23873.
- Sano, Y., Notsu, K., Ishibashi, J.I., Igarashi, G., and Wakita, H., 1991, Secular variations in helium isotope ratios in an active volcano: eruption and plug hypothesis: *Earth & Planetary Science Letters*, v. 107, no. 1, p. 95-100.
- Sano, Y., Takahata, N., and Gamo, T., 1995b, Helium isotopes in South Pacific deep seawater: *Geochemical Journal*, v. 29, no. 6, p. 377-384.
- Sano, Y., Tominaga, T., Nakamura, Y., and Wakita, H., 1982,  ${}^3\text{He}/{}^4\text{He}$  ratios of methane-rich natural gases in Japan: *Geochemical Journal*, v. 16, no. 5, p. 237-245.
- Sano, Y., Urabe, A., Wakita, H., Chiba, H., and Sakai, H., 1985a, Chemical and isotopic compositions of gases in geothermal fluids in Iceland: *Geochemical Journal*, v. 19, no. 3, p. 135-148.
- Sano, Y., and Wakita, H., 1985, Geographical distribution of He3/He4 ratios in Japan: implications for arc tectonics and incipient magmatism: *Journal of Geophysical Research*, v. 90, no. B10, p. 8729-8741.
- , 1988, Helium isotope ratio and heat discharge rate in the Hokkaido Island, Northeast Japan: *Geochemical Journal*, v. 22, no. 6, p. 293-303.
- Sano, Y., Wakita, H., and Giggenbach, W.F., 1987, Island arc tectonics in New Zealand manifested in helium isotope ratios: *Geochimica et Cosmochimica Acta*, v. 51, no. 7, p. 1855-1860.
- Sano, Y., Wakita, H., and Williams, S.N., 1990, Helium-isotope systematics at Nevado del Ruiz volcano, Colombia: implications for the volcanic hydrothermal system: *Journal of Volcanology & Geothermal Research*, v. 42, no. 1-2, p. 41-52.
- Sano, Y., Yakamura, Y., and Wakita, H., 1985b, Areal distribution of  ${}^3\text{He}/{}^4\text{He}$  ratios in the Tohoku district, northeastern Japan: *Chemical Geology (Isotope Geoscience Section)*, v. 52, no. 1, p. 1-8.
- Sapienza, G., Hilton, D.R., and Scribano, V., 2005, Helium isotopes in peridotite mineral phases from Hyblean Plateau xenoliths (south-eastern Sicily, Italy): *Chemical Geology*, v. 219, no. 1-4, p. 115-129.
- Sarda, P., Moreira, M., Staudacher, T., Schilling, J.G., and Alle?gre, C.J., 2000, Rare gas systematics on the southernmost Mid-Atlantic Ridge: Constraints on the lower mantle and the Dupal source: *Journal of Geophysical Research*, v. 105, no. B3, p. 5973-5996.
- Sarda, P., Staudacher, T., and Allegre, C.J., 1988, Neon isotopes in submarine basalts: *Earth & Planetary Science Letters*, v. 91, no. 1-2, p. 73-88.
- Scarsi, P., and Craig, H., 1996, Helium isotope ratios in Ethiopian Rift basalts: *Earth and Planetary Science Letters*, v. 144, no. 3-4, p. 505-516.

- Schilling, J.G., Kingsley, R., Fontignie, D., Poreda, R., and Xue, S., 1999, Dispersion of the Jan Mayen and Iceland mantle plumes in the Arctic: A He-Pb-Nd-Sr isotope tracer study of basalts from the Kolbeinsey, Mohns, and Knipovich Ridges: *Journal of Geophysical Research*, v. 104, no. B5, p. 10543-10569.
- Sedwick, P.N., McMurtry, G.M., Hilton, D.R., and Goff, F., 1994, Carbon dioxide and helium in hydrothermal fluids from Loihi Seamount, Hawaii, USA: temporal variability and implications for the release of mantle volatiles: *Geochimica et Cosmochimica Acta*, v. 58, no. 3, p. 1219-1227.
- Shaw, A.M., Hilton, D.R., Fischer, T.P., Walker, J.A., and Alvarado, G.E., 2003, Contrasting He-C relationships in Nicaragua and Costa Rica: Insights into C cycling through subduction zones: *Earth and Planetary Science Letters*, v. 214, no. 3-4, p. 499-513.
- Shaw, A.M., Hilton, D.R., Fischer, T.P., Walker, J.A., and de Leeuw, G.A.M., 2006, Helium isotope variations in mineral separates from Costa Rica and Nicaragua: Assessing crustal contributions, timescale variations and diffusion-related mechanisms: *Chemical Geology*, v. 230, no. 1-2, p. 124-139.
- Shaw M, A.M., Hilton R, D.R., Macpherson G, C.G., and Sinton M, J.M., 2001, Nucleogenic neon in high  $^3\text{He}/^4\text{He}$  lavas from the Manus back-arc basin: A new perspective on He-Ne decoupling: *Earth and Planetary Science Letters*, v. 194, no. 1-2, p. 53-66.
- Shimizu, A., Sumino, H., Nagao, K., Notsu, K., and Mitropoulos, P., 2005, Variation in noble gas isotopic composition of gas samples from the Aegean arc, Greece: *Journal of Volcanology and Geothermal Research*, v. 140, no. 4, p. 321-339.
- Smith, S.P., and Kennedy, B.M., 1985, Noble gas evidence for two fluids in the Baca (Valles Caldera) geothermal reservoir: *Geochimica et Cosmochimica Acta*, v. 49, no. 4, p. 893-902.
- Snyder, G., Poreda, R., Hunt, A., and Fehn, U., 2001, Regional variations in volatile composition; isotopic evidence for carbonate recycling in the Central American volcanic arc: *Geochemistry, Geophysics, Geosystems*, v. 2001, p. 25.
- Sorey, M.L., Evans, W.C., Kennedy, B.M., Farrar, C.D., Hainsworth, L.J., and Hausback, B., 1998, Carbon dioxide and helium emissions from a reservoir of magmatic gas beneath Mammoth Mountain, California: *Journal of Geophysical Research*, v. 103, no. 7, p. 15303-15323.
- Staudacher, T., and Allegre, C.J., 1989, Noble gases in glass samples from Tahiti: Teahitia, Rocard and Mehetia: *Earth & Planetary Science Letters*, v. 93, no. 2, p. 210-222.
- Staudacher, T., Kurz, M.D., and Allegre, C.J., 1986, New noble-gas data on glass samples from Loihi Seamount and Hualalai and on dunite samples from Loihi and Reunion Island: *Chemical Geology*, v. 56, no. 3-4, p. 193-205.
- Staudacher, T., Sarda, P., and Allegre, C.J., 1990, Noble gas systematics of Reunion Island, Indian Ocean: *Chemical Geology*, v. 89, no. 1-2, p. 1-17.
- Staudacher, T., Sarda, P., Richardson, S.H., Allegre, C.J., Sagna, I., and Dmitriev, L.V., 1989, Noble gases in basalt glasses from a Mid-Atlantic Ridge topographic high at 14°N: geodynamic consequences: *Earth & Planetary Science Letters*, v. 96, no. 1-2, p. 119-133.

- Staudigel, H., Zindler, A., Hart, S.R., Leslie, T., Chen, C.Y., and Clague, D., 1984, The isotope systematics of a juvenile intraplate volcano: Pb, Nd, and Sr isotope ratios of basalts from Loihu Seamount, Hawaii: *Earth & Planetary Science Letters*, v. 69, no. 1, p. 13-29.
- Stuart, F.M., Ellam, R.M., Harrop, P.J., Fitton, J.G., and Bell, B.R., 2000, Constraints on mantle plumes from the helium isotopic composition of basalts from the British Tertiary Igneous Province: *Earth and Planetary Science Letters*, v. 177, no. 3-4, p. 273-285.
- Stuart, F.M., Lass-Evans, S., Fitton, J.G., and Ellam, R.M., 2003, High  $^3\text{He}/^4\text{He}$  ratios in picritic basalts from Baffin Island and the role of a mixed reservoir in mantle plumes: *Nature*, v. 424, no. 6944, p. 57-59.
- Stuart, F.M., Turner, G., Duckworth, R.C., and Fallick, A.E., 1994, Helium isotopes as tracers of trapped hydrothermal fluids in ocean-floor sulfides: *Geology*, v. 22, no. 9, p. 823-826.
- Sturm, M.E., Klein, E.M., Graham, D.W., and Karsten, J., 1999, Age constraints on crustal recycling to the mantle beneath the southern Chile Ridge: He-Pb-Sr-Nd isotope systematics: *Journal of Geophysical Research*, v. 104, no. B3, p. 5097-5114.
- Sumino, H., Nakai, S., Nagao, K., and Notsu, K., 2000, High  $^3\text{He}/^4\text{He}$  ratio in xenoliths from Takashima: Evidence for plume type volcanism in southwestern Japan: *Geophysical Research Letters*, v. 27, no. 8, p. 1211-1214.
- Sumino, H., Notsu, K., Nakai, S., Sato, M., Nagao, K., Hosoe, M., and Wakita, H., 2004, Noble gas and carbon isotopes of fumarolic gas from Iwojima volcano, Izu-Ogasawara arc, Japan: Implications for the origin of unusual arc magmatism: *Chemical Geology*, v. 209, no. 1-2, p. 153-173.
- Symonds, R.B., Janik, C.J., Evans, W.C., Ritchie, B.E., Counce, D., Poreda, R.J., and Iven, M., 2003a, Scrubbing masks magmatic degassing during repose at Cascade Range and Aleutian-Arc volcanoes OF 03-0435p. 22.
- Symonds, R.B., Poreda, R.J., Evans, W.C., Janik, C.J., and Ritchie, B.E., 2003b, Mantle and crustal sources of carbon, nitrogen, and noble gases in Cascade-Range and Aleutian-Arc volcanic gases OF 03-0436p. 26.
- Taran, Y., Fischer, T.P., Pokrovsky, B., Sano, Y., Armienta, M.A., and Macias, J.L., 1998, Geochemistry of the volcano-hydrothermal system of El Chicho?n Volcano, Chiapas, Mexico: *Bulletin of Volcanology*, v. 59, no. 6, p. 436-449.
- Taran, Y.A., Fischer, T.P., Cienfuegos, E., and Morales, P., 2002, Geochemistry of hydrothermal fluids from an intraplate ocean island: Everman volcano, Socorro Island, Mexico: *Chemical Geology*, v. 188, no. 1-2, p. 51-63.
- Taylor, R.N., Thirlwall, M.F., Murton, B.J., Hilton, D.R., and Gee, M.A.M., 1997, Isotopic constraints on the influence of the Icelandic plume: *Earth and Planetary Science Letters*, v. 148, no. 1-2.
- Tedesco, D., 1997, Systematic variations in the  $^3\text{He}/^4\text{He}$  ratio and carbon of fumarolic fluids from active volcanic areas in Italy: Evidence for radiogenic  $^4\text{He}$  and crustal carbon addition by the subducting African plate?: *Earth and Planetary Science Letters*, v. 151, no. 3-4, p. 255-269.

- Tedesco, D., Allard, P., Sano, Y., Wakita, H., and Pece, R., 1990, Helium-3 in subaerial and submarine fumaroles of Campi Flegrei caldera, Italy: *Geochimica et Cosmochimica Acta*, v. 54, no. 4, p. 1105-1116.
- Tedesco, D., Miele, G., Sano, Y., and Toutain, J.P., 1995, Helium isotopic ratio in Vulcano island fumaroles: temporal variations in shallow level mixing and deep magmatic supply: *Journal of Volcanology & Geothermal Research*, v. 64, no. 1-2, p. 117-128.
- Tedesco, D., Nagao, K., and Scarsi, P., 1998, Noble gas isotopic ratios from historical lavas and fumaroles at Mount Vesuvius (southern Italy): Constraints for current and future volcanic activity: *Earth and Planetary Science Letters*, v. 164, no. 1-2, p. 61-78.
- Torgersen, T., and Jenkins, W.J., 1982, Helium isotopes in geothermal systems: Iceland, The Geysers, Raft River and Steamboat Springs ( USA): *Geochimica et Cosmochimica Acta*, v. 46, no. 5, p. 739-748.
- Torgersen, T., Lupton, J.E., Sheppard, D.S., and Giggenbach, W.F., 1982, Helium isotope variations in the thermal areas of New Zealand: *Journal of Volcanology and Geothermal Research*, v. 12, no. 3-4, p. 283-298.
- Trieloff, M., Kunz, J., and Alle?gre, C.J., 2002, Noble gas systematics of the Re?union mantle plume source and the origin of primordial noble gases in Earth's mantle: *Earth and Planetary Science Letters*, v. 200, no. 3-4, p. 297-313.
- Trull, T., Nadeau, S., Pineau, F., Polve, M., and Javoy, M., 1993, C-He systematics in hotspot xenoliths: implications for mantle carbon contents and carbon recycling: *Earth & Planetary Science Letters*, v. 118, no. 1-4, p. 43-64.
- Trull, T.W., Perfit, M.R., and Kurz, M.D., 1990, He and Sr isotopic constraints on subduction contributions to Woodlark Basin volcanism, Solomon Islands: *Geochimica et Cosmochimica Acta*, v. 54, no. 2, p. 441-453.
- Valbracht, P.J., Honda, M., Matsumoto, T., Mattielli, N., McDougall, I., Ragettli, R., and Weis, D., 1996, Helium, neon and argon isotope systematics in Kerguelen ultramafic xenoliths: Implications for mantle source signatures: *Earth and Planetary Science Letters*, v. 138, no. 1-4, p. 29-38.
- Valbracht, P.J., Staudacher, T., Malahoff, A., and Alle?gre, C.J., 1997, Noble gas systematics of deep rift zone glasses from Loihi Seamount, Hawaii: *Earth and Planetary Science Letters*, v. 150, no. 3-4, p. 399-411.
- van Soest, M.C., 2000, Sediment subduction and crustal contamination in the Lesser Antilles Island Arc: Amsterdam, Vrije Universiteit.
- van Soest, M.C., Hilton, D.R., and Kreulen, R., 1998, Tracing crustal and slab contributions to arc magmatism in the Lesser Antilles island arc using helium and carbon relationships in geothermal fluids: *Geochimica et Cosmochimica Acta*, v. 62, no. 19-20, p. 3323-3335.
- Vance, D., Stone, J.O.H., and O'Nions, R.K., 1989, He, Sr and Nd isotopes in xenoliths from Hawaii and other oceanic islands: *Earth & Planetary Science Letters*, v. 96, no. 1-2, p. 147-160.
- Wakita, H., and Sano, Y., 1983,  $^3\text{He}/^4\text{He}$  ratios in CH4-rich natural gases suggest magmatic origin: *Nature*, v. 305, no. 5937, p. 792-794.

- Wakita, H., Sano, Y., Mizoue, M., and Anonymous, 1987, High  $^3\text{He}$  emanation and seismic swarms observed in a nonvolcanic, forearc region: *Journal of Geophysical Research*, v. 92, no. 12, p. 12,539-12,546.
- Welhan, J.A., Poreda, R.J., Rison, W., and Craig, H., 1988a, Helium isotopes in geothermal and volcanic gases of the western United States, I. Regional variability and magmatic origin: *Journal of Volcanology & Geothermal Research*, v. 34, no. 3-4, p. 185-199.
- , 1988b, Helium isotopes in geothermal and volcanic gases of the western United States, II. Long Valley Caldera: *Journal of Volcanology & Geothermal Research*, v. 34, no. 3-4, p. 201-209.
- Winckler, G., Aeschbach-Hertig, W., Kipfer, R., Botz, R., Rub?el, Bayer, R., and Stoffers, P., 2001, Constraints on origin and evolution of Red Sea brines form helium and argon isotopes: *Earth and Planetary Science Letters*, v. 184, no. 3-4, p. 671-683.